Jl S. Afr. Bot. 50 (4): 425–434 (1984)

STUDIES IN THE GENERA OF THE *DIOSMEAE* (RUTACEAE): 15. A REVIEW OF THE GENUS *EMPLEURUM* AITON

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ABSTRACT

The two species in the genus *Empleurum* are described from fresh material with distribution maps and lists of specimens examined.

UITTREKSEL

STUDIES IN DIE GENERA VAN DIE *DIOSMEAE* (RUTACEAE): 15.
'N OORSIG VAN DIE GENUS *EMPLEURUM* AITON

Die twee species in die genus *Empleurum* word van vars materiaal beskryf. Verspreidingskaarte word gegee asook lyste van die ondersoekte eksemplare.

Key words: *Empleurum, Diosmeae*, Rutaceae.

HISTORICAL BACKGROUND

In the genus *Empleurum* the first species was described under the name *Diosma unicapsularis* by Linnaeus's son in the *Supplementum Plantarum* in 1781. The description was based on a fertile twig about 300 mm long, now housed in the Linnaean Herbarium in London. It was collected by Sparrmann at the Cape, most probably during his expedition towards the Fish River in the eastern Cape in 1775/76. This species had been collected previously by Auge, Thunberg and Masson. Plants were grown in the Royal Botanic Gardens at Kew, from seed received from Masson in 1774. Recognising it to be very different from *Diosma*, Solander, who is credited with writing the botanical descriptions in Aiton's *Hortus Kewensis*, placed it in a new genus which he named *Empleurum*, at the same time citing Linnaeus's *Diosma unicapsularis* in the synonymy. He also gave it the superfluous specific epithet *serrulatum*. Sonder in the *Flora Capensis* (1860) upheld the name *E. serrulatum* apparently failing to notice the earlier Linnaean name *D. unicapsularis* in literature. Thunberg's specimen collected in 1772 remained without mention in his herbarium until the publication of his *Pro-*

Accepted for publication 2 January, 1984.

dromus Plantarum Capensum in 1794, where it was placed in the genus *Diosma* and given the epithet *ensata* which is apparently an allusion to the sword-shaped horn on the mature fruit.

J. F. Gmelin in 1796, in the *Systema Naturae*, published the name *Empleurum aitoni*, citing the reference to the generic description on page 513 in the *Hortus Kewensis* but omitting any reference to the specific description on page 340 where the epithet *serrulatum* had already been published. Ecklon and Zeyher, who attempted to distinguish between large and small leaf forms of *E. unicapsulare*, made the combination *Empleurum ensatum* in order to designate the large leaf form and allowed *Empleurum serrulatum* to represent the small leaf form in their *Enumeratio Plantarum* published in 1835.

Seed received from the Cape Colony in 1910 by the United States Department of Agriculture prompted H. C. Skeels to make the new combination *Empleurum unicapsularis* (L.f.) Skeels, published in 1911, using a feminine rather than a neuter termination to the specific epithet. The same combination using the orthographically correct neuter termination was made by G. C. Druce as *Empleurum unicapasulare* (L.f.) Druce in 1917; Druce apparently being unaware of Skeels' earlier publication. It was not until 1915 that a second species in this genus was sent by P. J. Dormehl from the Grootvadersbos Forest Reserve to the Bolus Herbarium, where it was described by Miss Ruth Glover in the *Annals of the Bolus Herbarium* (1918) as *Empleurum fragrans*.

DISTRIBUTION

Populations of *E. unicapsulare* are found on a north/south axis almost exactly along the nineteenth degree of longitude from the vicinity of Algeria Forest Station near Clanwilliam to the Kogelberg near Betty's Bay with an outlier on the Piquetberg, and then eastwards along the whole length of the Langeberg, the Outeniqua and the Tsitsikamma mountains, as well as on the Swartberg, Kamassie and Koega mountains to the Elandsberg and Grootwinterhoeksberg near Uitenhage. They are always found in dampish places near streams growing in acid soil lying within the region of the Cape Geological System.

Small populations of the very rare *E. fragrans* are only found in the vicinity of Helderfontein in the Grootvadersbos Forest Reserve near Heidelberg (indicated by an open circle on the distribution map Fig. 1). They are also found in dampish places but at a somewhat higher elevation than populations of *E. unicapsulare*.

The genus is absent from the Cape Peninsula and Potberg.

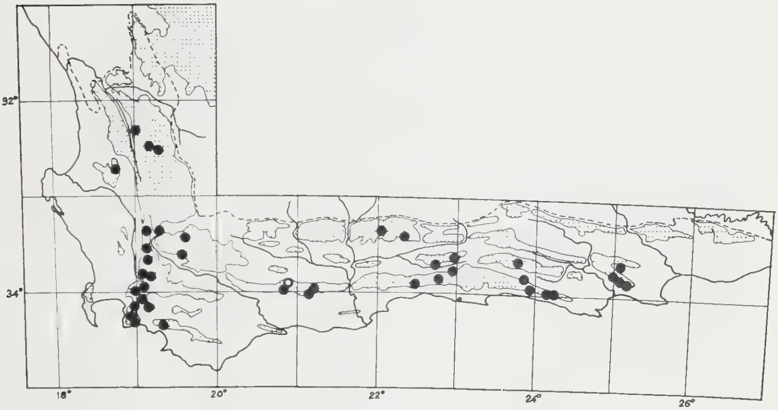

FIG. 1
Empleurum unicapsulare distribution: solid dots.
Empleurum fragrans locality: open dot.

GENERIC DESCRIPTION

Empleurum Solander ex Aiton, Hortus Kewensis **3**: 513 (1789); Juss., Gen. Plant.: 298 (1789); D. C. Prodr. **1**: 718 (1824); Endl., Gen. Plant. **6023**: 1159 (1840); Sond. in Flor. Cap. **1**: 441 (1860); Benth. & Hook., Gen. Plant. **1**: 291 (1862); Dyer, Gen. S. Afr. Flow. Plant. **1**: 292 (1975). Type species: *E. unicapsulare* (L.f.) Skeels.

Shrubs or *small trees* up to 4 m tall, erect, slender, willowy, completely glabrous, monoeciously polygamous. *Flowers* pseudo-axillary, pedicellate, often in pairs. *Calyx* 4-lobed. *Petals* absent. *Stamens* four. *Staminodes* and *disc* absent. *Ovary* superior, sessile with two ovules. *Style* delapsing. *Fruit* mostly 1-carpellate, horned.

DIAGNOSTIC CHARACTERS

The undivided gland-dotted leaves, dehiscent fruit, woody stem, four fertile stamens and exalbuminous seed, place the genus *Empleurum* in the suborder *Diosmeae* of the Rutaceae.

The 4-lobed calyx, the four stamens, the absence of petals, staminodes and disc, immediately distinguish this genus from all others in this suborder.

KEY TO THE SPECIES

Leaves 6–8 mm long .... **fragans** (2)
Leaves 20–60 mm long .... **unicapsulare** (1)

1. **Empleurum unicapsulare** (L.f.) Skeels in U.S. Dept. Agric. Bull. **207**: 54 (1911) also Druce in Rep. Bot. Exch. C1. Brit. Isles **1916** Suppl.: 621 (1917).

Diosma unicapsularis Linn.f., Suppl. Plant.: 155 (1781). Type: holotype: Without locality, *Sparrmann s.n.* (LINN *270/16*).

Empleurum serrulatum Soland. ex Ait., Hort. Kew. **3**: 340 (1789). Nom. superf. Type: as above.

Empleurum aitonii J. F. Gmel., Linn. Syst. Nat. ed. **2**: 268 (1796). Type: not known. Name apparently based on generic description only in Hort. Kew **3**: 513 (1789).

Diosma ensata Thunb., Prod. Plant. Cap.: 43 (1794). Type: In monte summo Roode Sand, Sept.–Oct. 1772. *Thunberg s.n.* (UPS-THUNB *5675*).

Empleurum ensatum (Thunb.) Eckl. & Zeyh., Enum. Plant.: 117 (1835). Type: as above.

Empleurum serrulatum Soland. ex Ait. var. *angustissimum* Berg in *Bot. Zeit.* **11**: t. 12, fig. V (1853). Type: Hottentots Holland (Altid. V) supra flumen "Palmietrivier" tum prope "Hanglipp" *Ecklon & Zeyher 920* (SAM, lecto.; PRE).

Empleurum serrulatum Soland. ex Ait. var. *ensatum* Berg in Bot. Zeit. **11**: t. 12, fig. X, Y (1853). Type: In montibus vallis "Tulbagh" (olim "Roode Sand") ad/rivulos supra "Waterfall" *Ecklon & Zeyher 919* (BOL, lecto.; PRE).

Empleurum serrulatum Soland. ex Ait. var. *intermedium* Berg in Bot. Zeit. **11**: t. 12, fig. W (1853). Type: no type cited or designated in original descript. Berg in Bot. Zeit. **11**: t. 12 fig. W taken as lectotype.

Icones: *Empleurum serrulatum* Soland. ex Ait., Lam. Tabl. encycl. **1**: t. 86 (1791); Gaertner, de Fruct. **3:** t. 211 (1805); Smith, Exot. Bot. **2**: t. 63 (1805); Bartl. & Wendl. Diosm. in Beitr. Bot. **1**: t. b, fig. 9 (1824); Juss. in Mem. Mus. Paris **13**: t. 7, No. 21 (1825).

Empleurum ensatum (Thunb.) Eckl. & Zeyh., Engler Pflanzenfam., ed. 2, **19a**: fig. 128 (1931).

Shrubs or *small trees* up to 4 m tall, erect, willowy, totally glabrous; trunk up to 110 mm diam. at base, straight, becoming branchless up to about 1,5 m from the ground; bark smooth. Branches erect, rod-like, brownish-red. *Branchlets* extremely numerous, straight, slender, pale greenish-yellow, gland-dotted, ribbed with decurrent leaf bases. *Leaves* up to 60 mm long, usually up to 3 mm wide, linear-lanceolate, spreading, alternate; apex acute with a small sharp point; margins serrate with immersed translucent gland dots; base narrowing to a petiole 1,5 mm long; abaxial surface minutely multi-gland-dotted to either side of the depressed midrib. *Inflorescence* 1,2 or 3-nate, in the axils of the leaves, apparently, terminal on vestigial branchlets; *flowers* monoeciously polygamous with male flowers outnumbering the hermaphrodite flowers by about 3 to 1. *Bract* 1,5 mm long, 0,25 mm broad at base, much reduced, subulate having the margins rolled inwards, gland-dotted below, pale green, weakly ciliolate, delapsing. *Bracteoles* two, 1 mm long, 0,1 mm broad, vestigial, subulate having the margins rolled inwards, pinkish, thinly ciliolate, arising 0,5 mm up from the base of the pedicel, soon delapsing. *Pedicel* slender, gland-dotted, in the male varying in length up to 5,5 mm, but becoming twice as long or more on mature fruits. *Calyx* 4-lobed; in bud elliptical in cross-section with the end two lobes overlapping the inner two lobes to accommodate the anthers, *lobes* ovate, obtuse, gland-dotted, persisting. *Petals* and *staminodes* absent. *Filaments* four, becoming 4,7 mm long and spreading at anthesis, acicular, finally delapsing. *Anthers* four, 3,7 mm long, 1,4 mm broad, yellow, shining; *apex* emarginate, pale green or reddened with a large immersed oil gland. *Pollen* 35 μm long, 25 μm broad, elliptical, dry. *Disc* absent, at the base of the ovary there are several small papillae. *Stigma* at first a somewhat thumb-shaped and very smooth, subterete, organ arising to the side of the base of the horn immediately above the ovary, becoming 4 mm long and 0,6 mm diam., eventually delapsing. There is no particular receptive stigmatic area to be seen. *Style* absent. *Ovary* vestigial in male flowers; in hermaphrodite flowers superior, subcylindrical, with two ovules. *Fruit* 1-carpellate, rarely twin, 17–20 mm long including the sword-shaped horn 8–9 mm long, glabrous, shining, gland-dotted, pedicellate with the calyx persisting. *Seed* 6,2–8 mm long, 2,8–3 mm broad, black, shining; aril mostly black.

The above description was prepared from fresh material collected by the author.

SPECIMENS EXAMINED

CAPE—3218 (Clanwilliam): South slope of head south of and next to Zebra Kop, Piquetberg Division (-DB), 4000 ft., 9/11/1934, *Pillans 7497* (BOL).
—3219 (Wupperthal): Algeria, Cedarberg, Clanwilliam Division (-AC), 26/1/1971, *Spreeth 103* (PRE, STE), 30/6/1972, *R. H. Andrag 91* (STE); Sederhoutkloof near Eikeboom, South Cedarberg, Clanwilliam Division, 3150 ft., 8/10/1975, *Williams 2099* (NBG, PRE, STE); Matjiesrivier, Cedarberg, Clanwilliam Division (-AD), –/1/1944, *Wagener 362* (NBG).
—3318 (Cape Town): Jonkershoek, Stellenbosch Division (-DD), 2100 ft., 18/4/1962, *Taylor 3275* (PRE, STE), 6/9/1972, *Kerfoot 6501* (PRE, STE).
—3319 (Worcester): In monte summo Roode Sand supra Waterfall prope rivulum (-AC), Sept.–Oct., 1772, *Thunberg s.n.* (UPS-THUNB 5675); Tulbagh Waterfall, Tulbagh Division, *Ecklon & Zeyher 919* ex parte (BOL, PRE), –/3/1903, *Marloth 2840b* (PRE), 16/11/1941, *Compton 12417* (NGB), 600 ft., 9/10/1975, *Williams 2105* (NBG, PRE, STE); Ceres Mountains near village, Ceres Division (-AD), 600 m, –/9/1924, *Marloth 6272* (PRE); Matroosberg near Laakenvlei, Ceres Division (-BC), 5500 ft., 20/1/1917, *Phillips 1958* (SAM); Witte River Valley, Wellington (-CA), –/5/1934, *Esterhuysen s.n.* (BOL); Du Toitskloof, 1000–2000 ft., Oct.–Jan., *Drège*

(a) III, A, c, 9 (PRE); French Hoek Mountains, Paarl Division (-CC), 900 m, –/1/1918, *Marloth 8163* (PRE); French Hoek, –/1/1896, *H .Bolus s.n.* (NBG *Guthrie 4088*); La Motte Plantation, French Hoek, 4/7/1935, *Barker s.n.* (BOL *32290*); French Hoek Forest Reserve, 3/9/1942, *Leighton s.n.* (BOL, PRE); Berg River Hoek, Paarl Division (-CD), 2000 ft., 3/10/1942, *Compton 13839* (NBG), 8/4/1944, *Compton 15635* (NBG); Keeromsberg, Worcester Division (-DA), 3000–4000 ft., 18/5/1944, *Esterhuysen 10168* (BOL).

—3320 (Montagu): Lemoenshoek Peak, Heidelberg Division (-DD), 4000 ft. –/9/1944, *Esterhuysen 10419a* (BOL), 2500 ft., 19/10/1966, *Rourke 627* (NBG, STE); On track to Helderfontein, Grootvadersbos, Heidelberg Division, 1600 ft., 26/10/1977, *Williams 2383* (NBG, PRE).

—3321 (Ladismith): Corrente River Farm, Riversdale Division (-CC), –/11/1908, *Muir 43* (PRE); Damp kloofs in Langeberg, Riversdale Division, 2000 ft., –/7/1925, *Muir 3642* (PRE); Garcias Pass, Riversdale Division, –/9/1929, *Muir 4468* (PRE).

—3322 (Oudtshoorn): Swartberg Pass, Prince Albert Division (-AC), *Hough s.n.* (PRE), –/–/1914, *Tugwell 13991* (PRE), 4800 ft., –/12/1905, *H. Bolus 11744* (PRE); Swartberg Pass south side, Oudtshoorn Division, 4000 ft., –/11/1898, *Marloth 2482* (PRE), 900 m, –/7/1925, *Marloth 12111* (BOL, PRE), 4000 ft., 8/5/1938, *Compton 7175* (NBG), 4200 ft., 31/5/1952, *Taylor 381* (PRE), 4500 ft., 19/6/1955, *Acocks 18275* (PRE), 4/10/1974, *Goldblatt 2951* (PRE); Rust en Vrede (-AD), 3000 ft., –/7/1925, *Dyer 83* (PRE); In Montagu Pass, George Division (-CD), 1200 ft., –/10/1880, *Young s.n.* (BOL *5512*); George, –/8/–, *Zeyher s.n.* (SAM); George above the F.M. Tower, 2000 ft., 25/12/1971, *Williams 1616* (NBG, PRE), 23/8/1975, *Williams 2048* (NBG); Buffelsrivier, south of Kamanassieberg, George Division (-DB), 4400 ft., 4/10/1971, *Thompson 1381* (PRE, STE); In the rocky kloof about the source of the Keurbooms River (-DD), 20/3/1814, *Burchell 5078* (BOL, PRE, SAM); Mannetjiesberg, south slopes, Uniondale Division, 5000 ft., 18/9/1967, *Rourke 865* (NBG); Sourflats Forest, Knysna Division, 800 ft., –/8/1916, *Keet s.n.* (STE *13759*); Hoogeberg on crest of mountain, Knysna Division, 4500 ft., 17/12/1922, *Keet 1064* (PRE, STE).

—3323 (Willowmore): Avontuur, Uniondale Division (-CA), 31/7/1947, *Rose s.n.* (NBG); Kouga Mountains, peak near Smutsberg, Uniondale Division (-DB), 4000ft., 12/11/1944, *Esterhuysen 10735* (BOL, PRE); Stormsrivier, Humansdorp Division (-DD) 280 ft., 14/11/1894, *Schlechter 5969* (BOL), 700 ft., –/9/1888, *Tyson 3020 or H.N.A.A. 986* (BOL, SAM); Die Hoek, Joubertina, Uniondale Division, –/7/1941, *C. J. Esterhuysen s.n.* (BOL, NBG), 5/11/1944, *Esterhuysen 10585* (PRE), ±2000 ft., –/3/1957, *Esterhuysen 27184* (BOL).

—3324 (Steytlerville): Between Assegaaibos and Witelsbos (-CC), –/4, –/8/1930, *Thode A2524* (PRE); Banks of the Elands River, Zitzikamma, 500 ft., 15/9/1897, *Galpin 3878* (PRE).

—3325 (Port Elizabeth): Groendal Wilderness Reserve, Groot Plaat Farm, Uitenhage Division (-CA), 3350 ft., 1/5/1974, *Scharf 1407* (PRE); Otterford Forest Reserve, Humansdorp Division (-CC), 3/8/1974, *Rodin 1131* (BOL, PRE); Loerie Plantation, Humansdorp Division, 6/10/1934, *Dix 69* (BOL); Longmore Forestry Station, Van Stadens Mountains, Port Elizabeth Division, 450 m, 28/9/1978, *Hugo 1397* (PRE, STE); Van Stadens, Port Elizabeth Division, –/5/1913, *Paterson 2441* (BOL), 31/5/1932, *Long 578* (PRE), 31/7/1932, *Long 624* (PRE).

—3418 (Simonstown): Kogelberg, Hottentots Holland Mountains, Caledon Division (-BB), –/8/1924, *Stokoe 917* (BOL, PRE), –/11/1924, *Stokoe s.n.* (SAM *59379*), 2100 ft., 27/8/1971, *Oliver 3462* (PRE, STE); Ridge east of Kogelberg peak, 3250 ft., 21/4/1970, *Boucher 1245* (PRE, STE), 3500 ft., 27/1/1971, *Rourke 1283* (NBG), *Stokoe s.n.* (SAM *27424*); Stellenbosch bei Grietjiesgat, –/5/–, *Ecklon & Zeyher s.n.* (PRE *10021*); In verticibus montium altis terrae "Hottentots-holland" (Altit.V) supra flumen "Palmietrivier" tum prope "Hanglipp", –/6/–, *Ecklon & Zeyher 920* (PRE, SAM); Moordenaars-kop, Hottentotsholland Mountains, Caledon Division, –/7/1940, *Stokoe s.n.* (SAM *57799*); Grabouw, Rooskraal Nature Reserve, 2225 ft., 8/5/1969, *Haynes H. 33* (STE), 10/6/1937, *Hubbard 439* (BOL, STE); Paardeberg, Kleinmond, Caledon Division, –/6/1950, *Stokoe s.n.* (SAM *64213*); Conical hill ridge to south of Kogelberg Peak, Caledon Division (-BD), 760 m, 31/1/1973, *Boucher 2086* (PRE, STE).

—3419 (Caledon): Nieuweberg Forest Station, Caledon Division (-AA), –/9/1935, *Stokoe 3192* (BOL), 2000 ft., 8/6/1973, *Oliver 4294* (PRE, STE); Houwhoek, Caledon Division, 700 ft., –/4/1982, *F. & F. A. Guthrie 2234* (NBG), 1000 ft., 30/4/1896, *Schlechter 7757* (PRE); Vogelgat, streamside above Main Falls, Caledon Division (-AD), 850 ft., 18/10/1980, *Williams 3083* (NBG).

Without precise locality: Coast Districts, 1867, *H. Bolus 1682* (BOL); *Auge* (BM); *Sparrmann s.n.* (LINN *270/16*); Port Elizabeth –/8/1927, *Brunt 249* (PRE); Ad latera montium ad Knysna and Longkoolf, –/11/–. *Mund s.n.* (SAM); Riviersonderend Mountains –/6/1949, *Stokoe 2160* (STE).

VARIATION AND BIOLOGY

There is a certain degree of variation in the size of the leaves and the height of the plants. Smaller plants with smaller leaves are found in the Hottentots Holland mountains from Nuweberg to Hangklip. A form with the broadest leaves has been found in the Elands River valley near Uitenhage at the extreme eastern end of the range. *E. serrulatum* sensu Ecklon & Zeyher refers to the form with smaller leaves and *E. ensatum* sensu Ecklon & Zeyher refers to the form with larger leaves. There is no justification for recognising these differences at specific or subspecific level as between the extremes intermediates exist.

Plants are only found growing in the vicinity of perennial streams or permanently damp places.

The flowering period extends over many months but appears to reach a peak from April to September, with fruiting being most plentiful between August and January.

The leaves are richly endowed with oil glands which apparently makes this species repulsive to insects and browsers.

The seeds are ejected by the usual catapult mechanism and having an eliasome are probably dispersed and buried by ants. Germination takes place after fires.

The leaves have a strong resinous smell when crushed but otherwise the plants smell faintly spicy, rather reminiscent of cinnamon. Common name: *false buchu*.

Of the two species in this genus, *Empleurum unicapsulare* can be distinguished by having leaves very much larger than those of its congener.

2. **Empleurum fragrans** Glover in Ann. Bol. Herb. **2.** 4: 153 (1918). Holotype: Cape—3320 (Montagu): Grootvadersbos Forest Reserve, Heidelberg Division (–DD), –/9/1915, *P. J. Dormehl s.n. dedit* (BOL *13325*).

Icon: *Empleurum fragrans* Glover loc.cit. Plate XA.

Shrubs 450 mm tall (plants killed in a previous fire were up to 1,7 m tall) with many stems arising from a single trunk in the grass or peat. *Branches* erect, slender, glabrous, straight; bark smooth with raised leaf scars, light brown or green. *Branchlets* very slender, somewhat lax, numerous, thinly puberulous, with raised glands, one on either side of each leaf base and others below, all turgid with oil smelling of sweet cedarwood. *Leaves* 6–7,5 mm long including the petiole 1 mm long, 2–2,3 mm broad, elliptic, acute, apiculate, glabrous, alternate, spreading-erect; abaxial surface with a few gland dots along either side of the sunken midrib; margins lumpy with swollen gland dots. *Inflorescence* solitary or sometimes twin, arising in the axils of the leaves, short-pedicellate; *flowers* monoeciously-polygamous with male flowers outnumbering the female flowers. *Bract* vestigial, 0,7 mm long, 0,2 mm broad, oblong, obtuse, ciliate, pinkish; a second bract subtends another immature floral bud. *Bracteoles* two, vestigial, 0,3 mm long, subulate, spiky ciliate, arising from a broad connate decurrent scale forming part of the pedicel. *Pedicel* about 1 mm long, glabrous. *Calyx* 4-partite, glabrous, gland-dotted; *lobes* 1–2,2 mm long, 0,6–0,7 mm broad, lanceolate acute, glabrous, gland-dotted, ciliate, persisting. *Petals* and *staminodes* absent. *Filaments* four, becoming 1,6 mm long, acicular, glabrous, pink, delapsing. *Anthers* four, 3 mm long, 1,1 mm broad, glabrous, deep red, apex with a large oil gland crowned with a sharp point. *Pollen* 22 μm diam., subspherical. *Stigma* at first a somewhat thumb-shaped organ arising at the side of the base of the horn, smooth, red in colour, becoming about 1,4 mm long, 0,3 mm diameter, eventually delapsing. *Style* absent. *Ovary* vestigial in male flowers; in hermaphrodite flowers superior with two ovules attached at the side where the stigma projects. *Fruit* 1-carpellate, 6 mm long including a short blunt horn 2 mm long, 2,4 mm broad, glabrous, gland-dotted. *Seed* 3,5–3,9 mm long, 1,5 mm broad, black, shining; aril black, inconspicuous.

Note: one ovule does not develop at all and can be traced when the seed is ripe.

The above description was prepared from fresh material collected by the author and supplements that which was previously given by Miss Glover.

Empleurum fragrans is easily distinguished from *E. unicapsulare* by having smaller leaves; by the acuminate calyx lobes and by the apiculate gland on the anther.

SPECIMENS EXAMINED

CAPE—3320 (Montagu): Grootvadersbos Forest Reserve, Heidelberg Division (-DD), –/9/1915, *P. J. Dormehl s.n. dedit* (BOL *13325*); Lower S slopes of Langeberg at Strawberry Hill, Heidelberg Division, 10/9/1944, *Esterhuysen 10380* (BOL, NBG, PRE, SAM); Langeberg upper south east slopes, Heidelberg Division, 4000 ft., 19/10/1966, *Rourke 629* (NBG, PRE); On track to Helderfontein, Grootvadersbos, Heidelberg Division, 4100 ft., 26/10/1977, *Williams 2380* (NBG, PRE), 27/10/1977, *Bean 11* (BOL), 17/2/1981, *Bean 529* (BOL); The approach to Lemoenshoek Peak along the path from the road back towards the deep kloof, 1500–2000 ft., 1/1/1979, *Esterhuysen 35163* (BOL).

PHYLOGENY AND DISCUSSION

Of those genera of the Rutaceae in the suborder *Diosmeae* with apocrapus fruits, the genus *Empleurum*, with only two species, is the only one to exhibit anemophily. This condition is no doubt the result of, or has progressively resulted in the following adaptive changes: taking first *E. unicapsulare* which is widespread and relatively common:

1. The plant has a tall willow-like habit, by far the tallest of other local members of the suborder which are almost all small rigid shrubs.
2. The "pseudo-axillary" flowers are numerous and are dispersed along all branchlets in the axils of the leaves at the ends of extremely reduced branchlets.
3. Male flowers outnumber the hermaphrodite flowers and are mostly found lower down on each branchlet.
4. Hermaphrodite flowers are found towards the apex of each branchlet, the gynoecium continuing to develop after anthesis and the falling off of the spent stamens.
5. Bracts and bracteoles are virtually vestigial and soon fall off.
6. Calyx 4-lobed, apparently reduced from five.
7. Petals absent.
8. Staminodes absent.
9. Disc absent and no nectar produced to attract insects.
10. Stamens reduced to four in number.
11. Anthers about three times larger than usual with a large immersed oil gland at the apex which no doubt acts to repel nibbling insects.
12. Pollen about half the normal size, subspherical, dry, abundant.
13. Ovary one-carpellate, very rarely two-carpellate; a possible reduction from five carpels.
14. Style absent.
15. Stigma very large becoming 4 mm long, much modified, bilaterally symmetrical, possibly receptive over its whole surface at some time.

E. fragrans, except that it is a small shrubby bush much smaller in every way with flowers that have become completely axillary, possesses all of the above characters. It is a rare species perhaps having a more recent ancestry.

ACKNOWLEDGEMENTS

The author gratefully acknowledges the assistance over many years provided by the staff at both the Bolus Herbarium at the University of Cape Town and at the Compton Herbarium, National Botanic Gardens at Kirstenbosch, where in particular he wishes to thank Miss Lovell Bosman and Dr. J. P. Rourke for help and guidance in the publication of all the papers in this series on the *Diosmeae*. I wish to thank the Botanical Research Institute for loans from their herbaria at both Pretoria and Stellenbosch and also Mrs. P. A. Bean for photographing the specimen of *Diosma unicapsulare* in the Linnaean Herbarium in London.